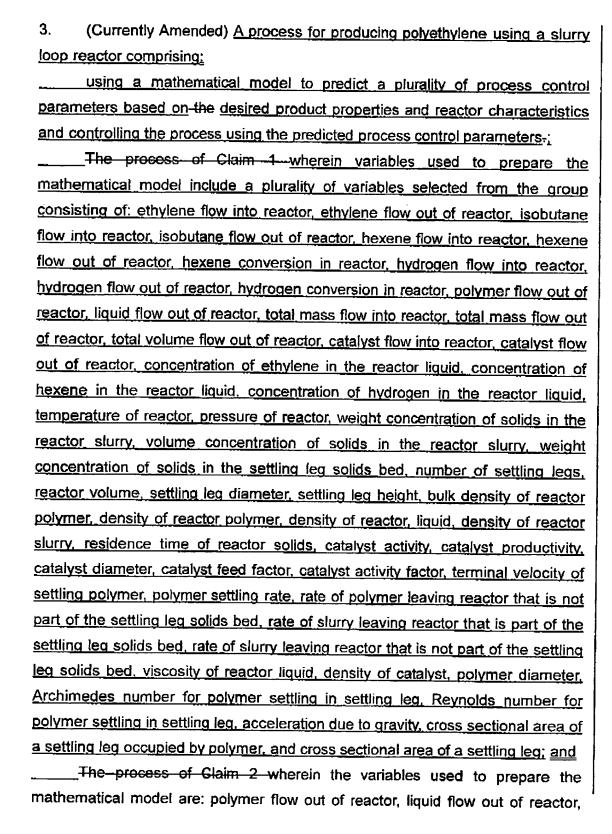
### **Amendments to the Claims:**

Claims 3-5, 7, and 9-11 are allowable, if rewritten. Other claim amendments have been made, as below. Newly added Claim 12 is also believed to be allowable.

## **Listing of Claims:**

#### WHAT IS CLAIMED IS:

- 1. (Cancelled)
- 2. (Cancelled)



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TOTAL PETROCHEMICALS

7134835384

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concentration of ethylene in the reactor liquid, temperature of reactor, pressure of reactor, weight concentration of solids in the reactor slurry, reactor volume, settling leg diameter, settling leg height, bulk density of reactor polymer, density of reactor polymer, and density of catalyst.

4. (Odmentily Amended) A process for producing polyethylene using a sturry
loop reactor comprising:
using a mathematical model to predict a plurality of process control
parameters based on the desired product properties and reactor characteristics
and controlling the process using the predicted process control parameters.
The process of Claim 1 wherein variables used to prepare the
mathematical model include a plurality of variables selected from the group
consisting of: ethylene flow into reactor, ethylene flow out of reactor, isobutane
flow into reactor, isobutane flow out of reactor, hexene flow into reactor, hexene
flow out of reactor, hexene conversion in reactor, hydrogen flow into reactor.
hydrogen flow out of reactor, hydrogen conversion in reactor, polymer flow out of
reactor, liquid flow out of reactor, total mass flow into reactor, total mass flow out
of reactor, total volume flow out of reactor, catalyst flow into reactor, catalyst flow
out of reactor, concentration of ethylene in the reactor liquid, concentration of
hexene in the reactor liquid, concentration of hydrogen in the reactor liquid,
temperature of reactor, pressure of reactor, weight concentration of solids in the
reactor slurry, volume concentration of solids in the reactor slurry, weight
concentration of solids in the settling leg solids bed, number of settling legs,
reactor volume, settling leg diameter, settling leg height, bulk density of reactor
polymer, density of reactor polymer, density of reactor, liquid, density of reactor
slurry, residence time of reactor solids, catalyst activity, catalyst productivity,
catalyst diameter, catalyst feed factor, catalyst activity factor, terminal velocity of
settling polymer, polymer settling rate, rate of polymer leaving reactor that is not
part of the settling leg solids bed, rate of slurry leaving reactor that is part of the
settling leg solids bed, rate of slurry leaving reactor that is not part of the settling
leg solids bed, viscosity of reactor liquid, density of catalyst, polymer diameter,
Archimedes number for polymer settling in settling leg, Reynolds number for
polymer settling in settling leg, acceleration due to gravity, cross sectional area of
a settling leg occupied by polymer, and cross sectional area of a settling leg; and
- The process of Claim 2 wherein the variables used to prepare the
mathematical model are: polymer flow out of reactor, liquid flow out of reactor,

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concentration of ethylene in the reactor liquid, temperature of reactor, pressure of reactor, weight concentration of solids in the reactor slurry, reactor volume, settling leg diameter, settling leg height, bulk density of reactor polymer, density of reactor polymer, density of catalyst, concentration of hexene in the reactor liquid, concentration of hydrogen in the reactor liquid, hexene conversion in reactor, and hydrogen conversion in reactor.

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5.	(Currently Amended) A process for producing polyethylene using a slurry
loop r	eactor comprising;
	using a mathematical model to predict a plurality of process control
paran	neters based on the desired product properties and reactor characteristics;
	ontrolling the process using the predicted process control parameters-; and
	_ <del>The process of Claim 1 wherein the process is controlled using the</del>
mathe	ematical model which has been incorporated into a computer spreadsheet.
6.	(Cancelled).
7.	(Currently Amended) A process for producing polyethylene using a slurry
loop re	eactor comprising-:
	using a mathematical model to predict a plurality of process control
<u>par</u> am	neters based on the desired product properties and reactor characteristics
	ontrolling the process using the predicted process control parameters;
	The process of Claim 1 wherein the process is controlled using the
<u>mathe</u>	matical model which has been incorporated into a controller; and
	The process of Claim 6 wherein the controller is a neural network model
based	controller.
8.	(Cancelled).

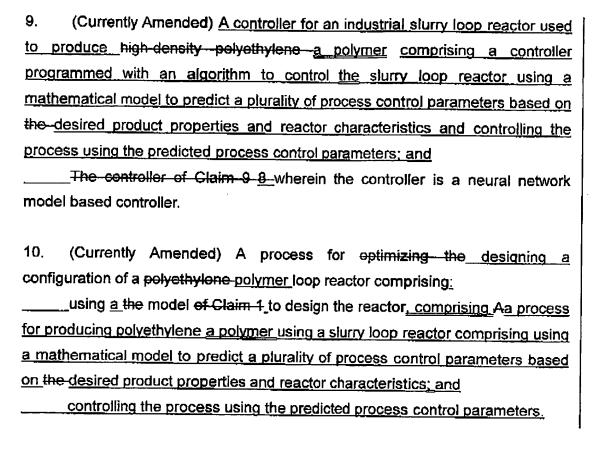
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TOTAL PETROCHEMICALS

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### 11. (Cancelled)

12. (New) A process for designing a configuration of a slurry loop reactor used to produce polymers comprising:

using a mathematical model to predict a plurality of process control parameters based on desired product properties and reactor characteristics and controlling the process using the predicted process control parameters, where variables used to prepare the mathematical model have a variability decreased by 70% in comparison to a conventional PID controller.